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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/816,169

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Marcel Mathijs Theodore Marie Dierichs

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EXAMINER

CHACKO DAVIS, DABORAH

ART UNIT

PAPER NUMBER

1756

MAIL DATE

DELIVERY MODE

08/28/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/816,169

Applicant(s)DIERICHS, MARCEL MATHIJS
THEODORE MARIE**Examiner**

Daborah Chacko-Davis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 June 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6,8-25,27-44 and 46-62 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6,8-25,27-44 and 46-62 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102/103

1. Claims 58-62, are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over U. S. Patent No. 2005/0136334 (Dierichs et al., hereinafter referred to as Dierichs).

Dierichs, in [0014], discloses ICs, integrated optical systems, guidance and detection patterns for magnetic domain memories, LCDs, and thin-film magnetic heads made using a lithographic apparatus (claims 58-62).

Dierichs teaches the claimed products formed by using the lithographic apparatus. The disclosed products of Dierichs and the instantly claimed products appear to be essentially the same, comprised of the same components, an integrated circuit, integrated optical systems, a guidance and detection pattern for magnetic domain memories, LCDs, and thin-film magnetic heads, and used in the same manner. The product by process limitations have been noted. However, it has been held that even though product by process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product by process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior art product was made by a different process. See *In re Thorpe*, 227 USPQ 964.

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2. Claims 58-62, are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over U. S. Patent Application Publication No. 2003/0058422 (Loopstra et al., hereinafter referred to as Loopstra).

Loopstra, in [0008], [0017], discloses products such as ICs, integrated optical systems, LCDs, guidance and detection patterns for magnetic domains memories, thin-film magnetic heads formed using a lithographic apparatus.

Loopstra teaches the claimed products formed by using the lithographic apparatus. The disclosed products of Loopstra and the instantly claimed products appear to be essentially the same, comprised of the same components, an integrated circuit, integrated optical systems, a guidance and detection pattern for magnetic domain memories, LCDs, and thin-film magnetic heads, and used in the same manner. The product by process limitations have been noted. However, it has been held that even though product by process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product by process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior art product was made by a different process. See *In re Thorpe*, 227 USPQ 964.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-6, 8-13, 15-25, 27-32, 34-38, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,902,705 (Okamoto et al., hereinafter referred to as Okamoto) in view of U. S. Patent No. 6,583,068 (Yan et al., hereinafter referred to as Yan) and U. S. Patent Application Publication No. 2003/0147058 (Murakami et al., hereinafter referred to as Murakami).

Okamoto, in col 5, lines 53-67, in col 7, lines 4-22, in col 9, lines 1-42, in col 17, lines 1-67, in col 18, lines 4-67, in col 31, lines 33-38, in figure 1, discloses a lithographic apparatus comprising an illumination system that provides a projection beam of radiation (reference 2), a mask mount (support structure) that supports the mask (patterning device), wherein the mask imparts the pattern to the projected beam of light (radiation), a wafer suction mount (substrate table) that holds that wafer (substrate), a projection system that projects the patterned beam onto the wafer (projection lens, reference 49 of figure 37), wherein the mask includes a shielding material layer (absorber layer) and includes means to correct aberrations (aberration correction means, minimize formation of aberrations in the patterned beam) (claims 1, and 20). Okamoto, in col 9, lines 1-42, in col 31, lines 21-52, discloses that the projection lens comprises reflecting means (lenses, mirrors etc are reflecting and refracting means) (claims 17, and 36).

The difference between the claims and Okamoto is that Okamoto does not disclose that the patterning structure comprises an aluminum absorber layer of the

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claimed thickness with a protective top coating. Okamoto does not disclose that the aluminum forms a substantially flat surface (claims 2, 21). Okamoto does not disclose that the aluminum has a substantially constant thickness (claims 3, 22). Okamoto does not disclose that the aluminum has thickness of about 50nm to about 200nm (claims 4, 23). Okamoto does not disclose that the aluminum has a thickness of about 70nm (claims 5, 24). Okamoto does not disclose that the protective top coating is selected from the group recited in claims 6, and 25. Okamoto does not disclose a protective coating of the claimed thickness (about 1nm) (claims 8, and 27). Okamoto does not disclose that the patterning structure comprises a bottom substrate material with a low coefficient of thermal expansion (claims 9, 28). Okamoto does not disclose a series of alternating layers of high index refraction material and low index refraction material beneath the aluminum layer (claims 10, 29). Okamoto does not disclose that the alternating layers of low index and high index material comprise 20 to about 80 layers (claims 11, 30). Okamoto does not disclose the claimed combinations of high index and low index refraction material recited in claims 12, and 31. Okamoto does not disclose that the high and low index refraction material layers have the claimed thickness recited in claims 13, and 32. Okamoto does not disclose that the patterning structure comprises a silicon dioxide buffer layer (claims 15-16, and 34-35). Okamoto does not disclose that the radiation in the claimed wavelength (EUV wavelength, 5-20nm) is used as the illumination light (claims 18-19, and 37-38).

Yan, in col 2, lines 18-65, in col 3, lines 4-26, and in figure 1(e), discloses

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that the patterning structure (mask) comprises a glass-ceramic material layer (substrate material) of low coefficient of thermal expansion, a multilayer mirror of alternating layers of high index and low index material, a buffer layer, an aluminum absorber layer, and a top protective layer. Yan, in col 3, lines 4-14, and in figure 1(d), discloses a substantially flat aluminum absorber layer (reference 1400), that may be formed of a thickness of about 45 to 215nm (substantially constant). Yan, in col 3, lines 5-16, and lines 33-36, and lines 42-52, discloses that top layer is formed by treating the absorber layer (aluminum) with a plasma of oxygen, nitrogen etc (resulting in the formation of a corresponding oxide or nitride). Yan, in col 3, lines 24-26, discloses that the protective top layer is thinner than the absorber layer and may be about 20 nm. Yan, in col 2, lines 18-47, and in col 3, lines 4-6, discloses that a multilayer mirror (prior to absorber layer formation, beneath the absorber layer, see figures 1(b) through 1(d)) of about 20-80 pairs of alternating layers of high refractive index material (Mo) and low refractive index material (Si) that have a thickness of about 2.8nm and 4.1nm respectively. Yan, in col 2, lines 18-26, and lines 60-65, and figures 1(b) through 1(c) discloses that the patterning structure (mask) includes a buffer layer that may be formed of silicon dioxide. Yan in col 1, lines 6-39, discloses that the lithography can be performed in the claimed wavelength range (EUV range of 5-20nm).

The difference between the claims and Yan is that Yan does not disclose that the protective top coating has a thickness of about 0.1 to 5nm. Yan does not disclose that the protective top coating has a thickness of about 1nm .

Murakami, in [0083], [0088], and in [0094], discloses that the protective top coating can grow to a thickness of 2nm on the absorbing-body layer (absorber layer).

Therefore, it would be obvious to a skilled artisan to modify Okamoto by employing the mask structure taught by Yan because Yan, in the abstract, in col 2, lines 14-16, discloses that using the claimed mask enables the use of the mask with high contrast (between the absorber region and the mirror region) at the inspection wavelength (EUV wavelengths). It would be obvious to a skilled artisan to modify Okamoto in view of Yan by employing the claimed thickness of the protective layer of the multi-layer film mirror stack as suggested by Murakami because Murakami, in [0056], discloses that the formation of the protective layer (in the claimed thickness upto 2nm i.e., about 1nm) on the absorbing body layer completes the formation of the multilayer-film mirror and in [0036], and [0037], discloses that the protective layer prevents the accumulation of contaminants on the EUV reflective reticle.

5. Claims 14, and 33, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,902,705 (Okamoto et al., hereinafter referred to as Okamoto) in view of U. S. Patent No. 6,583,068 (Yan et al., hereinafter referred to as Yan) and U. S. Patent Application Publication No. 2003/0147058 (Murakami et al., hereinafter referred to as Murakami), as applied to claims 1-13, 15-32, 34-38, and 58-62, above, and further in view of U. S. Patent Application Publication No. 2005/0040413 (Takahashi et al., herein after referred to as Takahashi).

Okamoto in view of Yan and Murakami is discussed in paragraph no. 3.

The difference between the claims and Okamoto in view of Yan and Murakami is that Okamoto in view of Yan and Murakami does not disclose a barrier layer between the high and low index refraction material layer (claim 14, and 33).

Takahashi, [1102], discloses an intermediate layer is interposed between the high refractive index layer and the low refractive index layer.

Therefore, it would be obvious to a skilled artisan to modify Okamoto in view of Yan by employing the method of incorporating a barrier layer between the high index layer and the low index layer as taught by Takahashi because Takahashi, [1102], discloses that doing so reduces the resistance of the multilayer reflector.

6. Claims 39-44, 46-51, and 53-57, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,583,068 (Yan et al., hereinafter referred to as Yan) in view of U. S. Patent Application Publication No. 2003/0147058 (Murakami et al., hereinafter referred to as Murakami).

Yan, in col 2, lines 18-65, in col 3, lines 4-26, and in figure 1(e), discloses a patterning structure (mask) that can be used in lithography comprising a glass-ceramic material layer (substrate material) of low coefficient of thermal expansion, a multilayer mirror of alternating high index and low index material, a buffer layer, an aluminum absorber layer, and a very thin top protective layer, wherein the absorber layer imparts the pattern to the beam of projected radiation (part of a mask structure) (claims 39, 47, and 55). Yan, in col 3, lines 4-14, and in figure 1(d), discloses a substantially flat aluminum absorber layer (reference 1400), that may be formed of a thickness of about

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45 to 215nm (substantially constant) (claims 40-42). Yan, in col 3, lines 5-16, and lines 33-36, and lines 42-52, discloses that top layer is formed by treating the absorber layer (aluminum) with a plasma of oxygen, nitrogen etc (resulting in the formation of a corresponding oxide or nitride) (claim 44). Yan, in col 3, lines 24-26, discloses that the protective top layer is thinner than the absorber layer and may be about 20 nm. Yan, in col 2, lines 18-47, and in col 3, lines 4-6, discloses that a multilayer mirror (prior to absorber layer formation, beneath the absorber layer, see figures 1(b) through 1(d)) of about 20-80 pairs of alternating layers of high refractive index material (Mo) and low refractive index material (Si) that have a thickness of about 2.8nm and 4.1nm respectively (claims 48-51). Yan, in col 2, lines 18-26, and lines 60-65, and figures 1(b) through 1(c) discloses that the patterning structure (mask) includes a buffer layer that may be formed of silicon dioxide (claims 53-54). Yan, in col 4, lines 4-26, and in figures 1(e) through 2(a) discloses that the a photoresist layer (radiation-sensitive layer, reference 1600) is formed on the protective top layer (reference 1500), and is then exposed, and developed to form a patterned photoresist which is then subject to reactive ion-etching to etch to form a pattern in the layers beneath (claims 56-57).

The difference between the claims and Yan is that Yan does not disclose that the protective top coating has a thickness of about 0.1 to 5nm. Yan does not disclose that the protective top coating has thickness of about 1nm (claim 46).

Murakami, in [0083], [0088], and in [0094], discloses that the protective top coating can grow to a thickness of 2nm on the absorbing-body layer (absorber layer).

Therefore, it would be obvious to a skilled artisan to modify Yan by employing the claimed thickness of the protective layer of the multi-layer film mirror stack as suggested by Murakami because Murakami, in [0056], discloses that the formation of the protective layer (in the claimed thickness upto 2nm i.e., about 1nm) on the absorbing body layer completes the formation of the multilayer-film mirror and in [0036], and [0037], discloses that the protective layer prevents the accumulation of contaminants on the EUV reflective reticle.

7. Claim 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,583,068 (Yan et al., hereinafter referred to as Yan) in view of U. S. Patent Application Publication No. 2003/0147058 (Murakami et al., hereinafter referred to as Murakami) as applied to claims 49-44, 46-51, and 53-57, above and further in view of U. S. Patent Application Publication No. 2005/0040413 (Takahashi et al., herein after referred to as Takahashi).

Yan in view of Murakami is discussed in paragraph no. 5.

The difference between the claim and Yan in view of Murakami is that Yan in view of Murakami does not disclose a barrier layer between the high and low index refraction material layer (claim 52).

Takahashi, [1102], discloses an intermediate layer is interposed between the high refractive index layer and the low refractive index layer.

Therefore, it would be obvious to a skilled artisan to modify Yan in view of

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Murakami by employing the method of incorporating a barrier layer between the high index layer and the low index layer as taught by Takahashi because Takahashi, [1102], discloses that doing so reduces the resistance of the multilayer reflector.

Response to Arguments

8. Applicant's arguments, see Remarks, on page 2, filed June 8, 2007, with respect to claims 1-6, 8-13, 15-25, 27-32, 34-38, and 58-62, have been fully considered and are persuasive. The 103 rejections of Dierichs et al., has been withdrawn. Applicant's arguments filed June 8, 2007, with respect to claims 39-44, 46-51, and 53-57, have been fully considered but they are not persuasive. The 103 rejections of Yan et al., are maintained.

A) Applicants argue that "as admitted by the Office Action, Yan et al., fails to disclose an aluminum absorber layer with a protective top coating having a thickness of about 0.1nm to about 5nm".

The Office action does not admit the statement of Argument A). The previous office action (paper no. 20070228) states that "Yan does not disclose that the protective top coating has thickness of about 0.1 to about 5nm". Murakami is depended upon to disclose a protective top coating of the claimed thickness.

B) Applicants argue that Yan's top layer and the protective coating of Murakami are different and that Yan requires a top layer of a significant thickness.

Yan neither requires that the protective layer be significantly thick nor teaches a certain thickness limitation. Yan merely suggests that the protective layer (top layer)

may be of a certain thickness (such as 20nm). Additionally, Murakami is depended upon for the claimed thickness. Yan's top layer and Murakami's protective layer are not different because Murakami forms a protective layer over the absorber layer, and Yan forms a top layer (protective layer) on the absorber layer. Murakami's (see paragraph nos. [0056], and [0057]) suggested protective layer thickness is for the completion of a multi-layer mirror, and not for changing or adversely effecting underlying layer properties.

C) Applicants argue that Yan's top layer is designed to have higher absorbance and/or lower reflectivity than the absorber layer, and is in contradiction to that of Murakami, wherein Murakami's protective layer imparts no reflectivity decrease to the optical element.

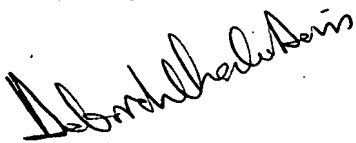
Yan's top layer (i.e., protective layer of Yan), only in certain embodiments (see col 3, lines 27-32), may have higher absorbance and/or lower reflectivity than the underlying absorbance layer. Murakami does not compare the protective layer properties (absorption and/or reflectivity) with that of the absorber layer; Murakami (in [0022])) compares the optical properties of its protective layer to that of its first layer of the multilayer mirror, not the underlying absorber layer. This is not the comparison disclosed in Yan. Murakami does not suggest or teach an optical property comparison of the protective layer with the underlying absorber layer. Therefore, the teaching of Murakami, wherein a very thin protective layer is formed on the absorber layer, is not at all contradicting to the teaching of Yan et al.

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Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dcd



August 24, 2007.